

CLAIMS

5 1- A molecule comprising three segments :

- a targeting segment C capable of binding to the membranes of cells engaged in an apoptosis process ;
 - a therapeutic segment A comprising a biologically active compound ; and
 - a linker segment L between the targeting segment and the therapeutic segment,
- 10 said linker segment L being cleavable in vivo in the environment of a tissue or of a cell in apoptosis.

2- The molecule according to claim 1, wherein said linker segment L comprises a chemical function recognised and cleaved by an enzyme or a set of enzymes specific to the
15 environment of the targeted cells.

3- The molecule according to claim 1 or 2, wherein said linker segment L comprises a sequence recognised and cleaved by a protease present by majority in the targeted tissue, more particularly selected from a metalloprotease of the extracellular matrix, a urokinase,
20 and a protease specific to the cleaving of the extracellular segment of the membranous cytokines or of their receptors.

4- The molecule according to any of claims 1 to 3, wherein said linker segment L comprises a sequence selected in that it contains at least one B1-B2 residue couple given in
25 the following table :

B ₁	B ₂
Val/Ala/Leu/Met	X
Leu/Tyr/Phe	X
Ala	Leu
Leu	Val
Val	Cys
Gly	Leu/Ile

Gly	Val
Ala	Val
Asn	Val
Arg	Phe
Gly/Ala/Asn/Glu/Gln/Pro/Arg/His/Asn	Hydrophobes, natural or not
Polar : Arg/Asp/Glu/Gln/Thr/Asn Hydrophobe : Ala	Hydrophobes, natural or not

wherein X is any amino acid residue, natural or not.

- 5- The molecule according to any of the preceding claims, wherein said targeting segment C is capable of binding to the membranes comprising lipids, the total electrostatic charge of which is negative, in particular phosphatidylserine.

6- The molecule according to any of the preceding claims, wherein said targeting segment comprises the following peptidic sequence :

10 J¹-J²-J³-J⁴-J⁵-J⁶-Z⁷-U⁸-J⁹-J¹⁰-U¹¹-R-J¹³-J¹⁴-U¹⁵-K-G-X¹⁸-G-T-J²¹-E-J²³-J²⁴-U²⁵-J²⁶-J²⁷-J²⁸-U²⁹-J³⁰-J³¹-R-J³³-J³⁴-J³⁵-J³⁶-B³⁷-J³⁸-J³⁹-U⁴⁰-J⁴¹-J⁴²-J⁴³-U⁴⁴-J⁴⁵-J⁴⁶-J⁴⁷-J⁴⁸-J⁴⁹-R-J⁵¹-U⁵²-J⁵³-J⁵⁴-D-U⁵⁶-K-S-Z⁵⁹-L-J⁶¹-J⁶²-J⁶³-J⁶⁴-Z⁶⁵-J⁶⁶-J⁶⁷-U⁶⁸-J⁶⁹-J⁷⁰-J⁷¹-U⁷²-J⁷³-J⁷⁴-J⁷⁵-J⁷⁶

(S1)

wherein J, Z, U, X, and B represent amino acids such that :

- 15 - the J amino acids are selected independently of one another from the natural amino acids, or from derivatives thereof, such that at least 50 % of them are polar residues selected from R, N, D, C, Q, E, G, H, K, Orn, P, S, T and Y,
 - the U amino acids are selected from A, C, G, I, L, M, F, W, Y, and V,
 - amino acid X¹⁸ is selected independently of the other amino acids of the sequence
20 from A, N, C, Q, G, H, I, L, M, F, S, T, W, Y and V,
 - amino acid B³⁷ is selected independently of the other amino acids of the sequence from R, A, C, G, I, L, M, F, W, Y, and V,
 - amino acid Z⁷ is selected independently of the other amino acids of the sequence from D and E,
25 - amino acids Z⁵⁹ and Z⁶⁵ are selected independently from E, D, K, and R,
 the exponents indicating the position of the amino acids in the sequence.

7- The molecule according to claim 6, wherein amino acids U and B are selected according to one of the examples given below :

	U ⁸	U ¹¹	U ¹⁵	U ²⁵	U ²⁹	B ³⁷	U ⁴⁰	U ⁴⁴	U ⁵²	U ⁵⁶	U ⁶⁸	U ⁷²
Ex 1	V	L	M	I	L	R	I	Y	L	L	V	L
Ex 2	A	I	I	I	L	R	I	Y	L	L	I	L
Ex 3	A	I	I	I	L	R	I	Y	L	L	M	V
Ex 4	A	L	M	L	L	R	I	Y	L	L	I	M
Ex 5	A	L	M	I	I	R	V	Y	L	L	I	M
Ex 6	A	L	M	I	I	R	I	F	L	L	I	M
Ex 7	A	L	M	I	V	R	I	F	L	L	I	F
Ex 8	V	L	M	I	L	R	I	F	L	L	I	M
Ex 9	A	L	M	I	L	R	I	F	L	L	I	M
Ex10	A	L	M	I	L	R	I	Y	L	L	A	A
Ex11	V	L	M	I	L	R	I	Y	L	L	V	L
Ex12	V	L	M	I	L	R	I	F	L	L	V	L

8- The molecule according to any of the preceding claims, wherein said targeting segment C comprises a sequence selected from the group consisting of sequences SEQ ID Nos 23-32.

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9- The molecule according to any of claims 1-5, wherein said targeting segment C comprises the sequence of all or part of an annexin, of a C1 or C2 type domain of the blood coagulation factors, of a domain V of a protein of the family of 2-Glycoproteins-I, of a FYVE type domain, of a PH type domain, or a fragment or a derivative having at least 10 % of identity.

10- The molecule according to claim 9, wherein said targeting segment C comprises a sequence selected from sequences SEQ ID Nos 1-16 and 17-22, preferably SEQ ID Nos 2-4, 6-8, 10-12, 14-16 and 19-22 or a fragment thereof.

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11- The molecule according to any of the preceding claims, wherein said therapeutic segment A has anti-tumoral activity.

12- The molecule according to claim 11, wherein said therapeutic segment A is selected from the group consisting of a molecule of the family of TNF α or derivatives thereof (TRAIL-Do), a human IL4 molecule or one of its isoforms, a molecule of the family of

anthracyclines or one of its active derivatives, preferably doxorubicin, a taxane molecule such as paclitaxel or docetaxel or one of its active derivatives, a methotrexate molecule or one of its active derivatives, 2-methoxyestradiol or one of its active derivatives, molecules of the family of antipyrimidines such as cytosine arabinoside or difluorodesoxycytidine or 5 one of their active derivatives, molecules of the family of alkylating agents derived from nitrogen mustards such as phenylalanine mustard (Melphalan) or a derivative such as Chlorambucyl.

13- The molecule according to any of claims 1-10, wherein said therapeutic segment A has
10 anti-inflammatory activity.

14- The molecule according to claim 13, wherein said therapeutic segment A is selected from the group consisting of an N-terminal segment of human annexin I, in particular NTA1, anti-inflammatory cytokines, and in particular IL10 and IL13 or one of their 15 appropriate mutants, the non-activating inhibitors of the membranous receptors of pro-inflammatory cytokines such as in particular the inhibitor of the IL1 receptor or an appropriate mutant of this inhibitor, glucocorticoids, non-steroid anti-inflammatories or their derivatives considered to be inhibitors of cyclo-oxygenase enzymes 1 and 2, and Methotrexate, an inhibitor of the membranous receptors of the family of TNFR, in 20 particular peptides containing at least the corresponding CRD1 extracellular domain.

15- A pharmaceutical composition comprising a molecule according to any of the preceding claims.

25 16- The use of a molecule according to any of claims 1-14 for manufacturing a medication.

17- The use of a molecule according to claim 11 or 12 for manufacturing a medication intended for cancer treatment.

30 18- The use of a molecule according to claim 13 or 14 for manufacturing a medication intended for the treatment of an inflammatory disease.